ORIGINAL

Philip A. Nicholas
Jason M. Tangeman
Anthony, Nicholas, Tangeman & Yates, LLC
170 N. Fifth Street
P.O. Box 0928
Laramie, WY 82073
(307) 742-7140
(307) 742-7160 Fax

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U.S. DISTRICT COURT
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12:05
Stephan Harris, Clerk
Cheyenne

James B. Harris
Steven R. Baggett
Becky L. Jolin
Thompson & Knight, L.L.P
1700 Pacific, Suite 3300
Dallas, TX 75201
214-969-1102
214-880-3274 Fax

Attorneys for Defendant Mountain Cement Company

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF WYOMING

Biodiversity Conservation Alliance and Sierra Club,	)	
Plaintiffs,	)	Case No. 04CV 361-B
v.	)	
Mountain Cement Company,	)	
Defendant.	)	

AFFIDAVIT OF RALPH L ROBERSON, RMB CONSULTING & RESEARCH, INC.

STATE OF NORTH CAROLINA)
)ss.
County of Wake)

Ralph L. Roberson, with RMB Consulting & Research, Inc. (RMB) being first duly sworn, deposes as says as follows:

1. I am over the age of 21 and fully competent to make this affidavit.

2. The facts and matters stated herein are within my personal knowledge, and are true and correct.

3. I received my Bachelors and Masters degrees in mechanical engineering from the University of Virginia.

4. I am a registered professional engineer and president of RMB Consulting & Research, Inc.

5. I have approximately 35 years of experience in analyzing air pollution emission standards, conducting air pollution measurements, and assessing the performance of air pollution control technology. Since 1975, I have reviewed, analyzed and provided technical comments on every rule proposed by EPA that affects continuous emission monitors and continuous emission monitoring requirements for power plants and other industrial sources.

6. In 1983, I was the principal author of *Continuous Emission Monitoring Guidelines*, a document published and still being used and updated by the Electric Power Research Institute (EPRI).

7. For the past decade, I have worked extensively to develop the use of state-of-the-art statistical techniques for (1) estimating emissions and analyzing emission data; (2) determining achievability of emission standards; and (3) assessing impacts on ambient air quality.

8. During the preceding 4 years I have testified at the trial of *Grand Canyon Trust et al. v. Public Service Company of New Mexico*, No. CV 02-552 BB/ACT (New Mexico), and I have given depositions in the following two cases: *United States et al. v. Ohio Edison et al.*, No. C2-99-1181 (S.D. Ohio), and *Sierra Club, et al. v. NREPC, et al.*, File Nos. DAQ-26003-037 and DAQ-26048-037 (Kentucky Administrative Proceeding).

9. The Mountain Cement Company ("MCC") retained me to provide expert opinion on the two primary methods of measuring opacity (i.e., EPA Reference Method 9 and continuous opacity monitoring systems (COMS)).

Summary of Conclusion

10. In my opinion, because of its original development as a "periodic" standard, the Wyoming opacity standard, when enforced with COMS data, is considerably more stringent than the limit when enforced with periodic Method 9 observations. This principle will be discussed in detail in subsequent sections of my expert report. In recognition of this principle, a number of states have or are in the process of amending their visible emissions rules to adjust the stringency to account for the use of COMS data. I believe that had Wyoming had COMS data when the opacity standard was developed many years ago, Wyoming would in all likelihood have provided de minimis relief periods during which excursions above the numerical limit are excused.

Bases for Opinions

11. The MCC facility produces Portland cement using two coal-fired kilns and various other process components including raw mills, clinker coolers, and material handling equipment.

12. In simple terms, the Portland cement process involves blending limestone with shale or clay and iron and grinding the material into a fine powder, which is called raw meal. The raw meal is fed into a rotary kiln, which uses coal to generate the temperatures necessary to form clinker. The clinker is cooled, mixed with gypsum and ground into a fine power, which is Portland cement.

13. In this Affidavit, I present a comparison of the two opacity measuring methods, the resulting impact on the stringency of the opacity standard applicable to MCC's plant located in Laramie, Wyoming when using periodic readings (i.e., Method 9) versus the use of continuous data (i.e., COMS), and other technical issues related to monitoring opacity from flue gas stacks.

Overview of Types of Emission Standards

14. Emission standards developed by regulatory agencies generally fall into two categories: (1) periodic standards – in which the evaluation of the source and the control equipment is based on limited periodic "snapshots" of emissions using short-term tests performed during representative operating conditions (e.g., stack tests, Method 9 data); and (2) continuous standards – in which the evaluation of the source and of the control technology is based on data obtained from continuous monitoring, that is, data collected during all operating conditions.

15. The primary characteristic of a "periodic" standard is that it is developed from the analysis of a limited data set collected during representative operating conditions. Periodic emission tests cannot quantify long-term variability in the operation of a source or in the operation of any control technology.[1] Emission standards developed from such periodic tests are therefore not designed to be monitored on a continuous basis. Thus, in my opinion, data obtained from continuous monitoring systems, such as COMS, should not be used as a measure of compliance with emission standards based on periodic tests such as Method 9. In contrast, "continuous" standards that are developed based on long-term, continuous emissions data allow the variability of both the source and the control technology to be factored into the setting of an emission standard.

[1] Throughout this Affidavitt, when I use the phrase, *variability*, with respect to the operation of a source, I am referring to the fact that, in my opinion, no process or piece of equipment operates as designed 100 percent of the time. In fact, processes and equipment are subject to breakdowns, malfunctions, and other natural perturbations.

16. When short-term tests are used to collect the data for the development of "periodic" standards, the compliance method specified for such standards is generally the same periodic test performed under "representative" (but not all) operating conditions. Similarly, when continuous data are used to develop "continuous" standards, the continuous method (e.g., a continuous emission monitor) is generally specified for determining compliance with those standards.

17. From time to time, regulatory agencies are faced with a situation in which a continuous method for monitoring emissions from a source becomes available long after a standard based on periodic test data has been established. In such situations, the application of the continuous method to determine compliance with a periodic standard would make the standard more stringent. To maintain the same stringency, agencies convert the "periodic" standard to a "continuous" standard before requiring the use of the continuous method for determining compliance. In making this conversion, agencies recognize that the stringency of an emission limit is determined not just by the numerical value of the standard but also by the averaging time associated with the numerical limit and the method used to make emission measurements. Agencies generally convert a "periodic" standard to a "continuous" standard by adjusting the averaging time or by providing for de minimis relief periods during which excursions above the numerical limit are excused.

18. The examples provided below illustrate this point in the context of EPA's rulemaking process for New Source Performance Standards (NSPS) under the Clean Air Act and State agency revisions to opacity standards as a result of the availability of COMS data.

Interrelationship of the Elements that Make Up Emission Standards

19. As previously stated, an emission standard consists of at least three essential, interrelated elements: (1) the numerical limit, (2) the averaging time, and (3) the compliance measurement method and/or frequency. The following examples taken from EPA rulemaking actions illustrate the Agency's recognition that altering any one of the interrelated elements of an emissions standard without making a compensating adjustment can affect the stringency of the underlying standard. Paragraphs 67 through 70 of this Affidavit will provide similar examples of regulatory actions, taken at the state level, that reflect acknowledgment of the impact of measurement frequency on the stringency of an emission standard.

Averaging Time

20. The interrelationship of numerical emission limits and averaging time is illustrated by EPA's rulemaking efforts in developing standards for new utility boilers in 40 CFR 60, Subpart D. EPA proposed and promulgated Subpart D in 1971.[2] At that time, EPA's data for developing emission standards were limited to periodic, snapshot measurements. EPA analyzed these data and set standards for particulate matter (PM), opacity, SO_2 and NO_x. To be consistent with the supporting data (and recognizing that continuous measurement technology was still under development), EPA specified compliance demonstrations be based on the periodic application of manual test methods to be conducted under representative operating conditions.

21. In contrast, when EPA undertook revising the NSPS in the late 70's, the Agency decided it wanted to use continuous data for its SO_2 and NO_x emission standards. Accordingly, EPA used continuous emission monitors (CEMS) to collect the background data, conducted a

[2] Subpart D applies to fossil fuel-fired steam generators (i.e., boilers) for which construction commenced after August 17, 1971.

rigorous statistical analysis of the data, and concluded that rolling 30-day averages were appropriate for the numerical emissions limits that the agency had selected.

22. In October 1983, EPA proposed to change the compliance method for the Subpart D SO_2 NSPS from a periodic method to a continuous method.[3] At the heart of EPA's proposal was a switch from periodic measurements (i.e., EPA Method 6) to continuous emission measurements (i.e., CEMS).

23. When considering this change to the measurement procedure, EPA recognized that it also needed to address the issue of averaging time. After reviewing the underlying database, especially the data pertaining to the sulfur content of coal, EPA concluded that a 30-day rolling average would be the appropriate averaging time to maintain consistency with the Subpart D SO_2 NSPS as it was promulgated in 1971.

24. In its October 1983 proposal, EPA produced two tables that clearly illustrate the relationship between numerical limits and averaging times. Table 1 in EPA's proposal presented the range of average sulfur concentration in coal required to meet the 1.2 $lb/10^6$ Btu emission limit as a function of averaging time. Table 2 listed the U.S. low-sulfur coal reserves that would be expected to comply with various mean sulfur concentrations listed in Table 1. When Tables 1 and 2 are read together, it is apparent that a short-term (e.g., 3-hour) interpretation of the NSPS would severely limit the supply of compliance coal. However, on a longer-term basis (i.e., 30-day rolling average), about 25 percent of the known U.S. coal reserves could comply with the 1.2 $lb/10^6$ emission limit. Since this outcome was the Agency's original intent of the NSPS, EPA concluded that a 30-day rolling average would be the appropriate averaging time to couple with continuous SO_2 monitoring data.

[3] 48 Fed. Reg. 48960 (October 21, 1983).

25. Although EPA never finalized this rulemaking, the Agency's technical analysis clearly quantifies the relationship between numerical limits and averaging times. Since the revisions to Subpart D were not finalized, the SO_2 standard in this rule remains a periodic standard.

26. Another example of the relationship of averaging time and stringency of an emission standard can be found in the sulfur dioxide (SO_2) portion of the NSPS proposed by EPA for fluid catalytic cracking unit (FCCU) regenerators at petroleum refineries.

27. In its proposal, EPA specified a 3-hour averaging time for the SO_2 emission standard for new, modified, and reconstructed FCCUs.[4] Commenters stated that the averaging time should be increased because 3 hours did not provide adequate time to adjust parameters, to account for the natural variability of the operating process as well as the air pollution control technology, and thus assure compliance with the proposed emission standard at all times.

28. In promulgating the final rule, EPA stated that it had statistically analyzed the long-term variability of SO_2 emissions from FCCUs by conducting a time series analysis of continuous emission data from a recent EPA study. EPA concluded that the averaging time did, indeed, need to be lengthened in order for the numerical limit to be consistently achieved with the use of continuous emission monitors. Accordingly, EPA revised the proposed averaging time for the SO_2 emission standard from 3-hours to 7-days.[5]

Compliance Measurement Methods

29. The relationship of the stringency of an emission standard and measurement procedure (e.g., measurement frequency) is illustrated in EPA's NSPS rule for kraft pulp mills (i.e., paper mills). The preamble to that rule also provides an excellent discussion regarding how

[4] 49 Fed. Reg. 2058 (January 17, 1984).
[5] 54 Fed. Reg. 34008 (August 17, 1989).

EPA can use both periodic tests and continuous monitoring data to achieve the objective of the NSPS program.

30. The first objective of an NSPS is to ensure that an affected source installs and operates the best demonstrated control technology.[6] EPA selects a numerical emission limit to reflect the performance of the best system of emission reduction when properly operated and maintained. The required performance test verifies the ability of the source to meet that emission limit.

31. The second objective of an NSPS is to ensure that the source complies with the general duty to properly operate and maintain its equipment. [7] I believe EPA recognized that performance tests are time consuming and expensive to perform, and that continuous monitors could play an important surveillance role in verifying a source's general duty to operate equipment consistent with good air pollution practices, but this surveillance role did <u>not</u> contemplate using the continuous monitoring data to verify whether the emission limit of a "periodic" emission standard was being met.

32. EPA determined that continuous monitors could be useful in identifying periods of excess emissions. Reports of excess emissions, in turn, could provide the Agency with information to determine if a source is meeting its general duty requirements to operate and maintain equipment to minimize emissions. EPA also realized that the continuous monitors (because of their capability of continuous measurements) identify <u>all</u> periods of excess emissions, including those that are <u>not</u> the result of improper operation of control equipment. EPA acknowledged that excess emissions encountered during start-up, shutdown, and

[6] Section 111 of the Clean Air Act states, "a standard of performance shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction ... the Administrator determines has been adequately demonstrated."
[7] The "General Duty" provision of the NSPS is codified in Title 40, Code of Federal Regulations, §60.11(d).

malfunctions are generally unavoidable and should not be attributed to improper operation and maintenance.

33. I also believe EPA recognized that process and pollution control equipment does not always perform as designed and thus excess emissions, which occur as a result of inherent variability or fluctuation within a process, should not be attributed to improper operation and maintenance of the control technology.

34. Accordingly, in the kraft pulp mill NSPS, EPA established both a periodic Method 9 opacity and a parallel continuous monitoring opacity standard. The periodic opacity limit is 35 percent when measured by Method 9; but when continuous monitoring is used, periods in excess of 35 percent opacity are not violations unless more than 6 percent of the readings (excluding startup, shutdown, and malfunction) in a calendar quarter exceed 35 percent. In other words, there is a 6 percent de minimis level when compliance with the opacity limit is based on continuous monitoring data.[8]

35. EPA tempered the stringency that would have resulted from the use of any or all of the continuous opacity data from the monitors by providing a de minimis exceedance level in recognition of the frequency of measurement.

Numerical Limits

36. Finally, an example of the adjustment of the stringency of an emission standard by modification of the numerical limit is EPA's revision to the NSPS for the primary aluminum industry. EPA originally promulgated a fluoride emission limit of 1.9 lb/ton of aluminum produced for prebake plants and 2.0 lb/ton for Soderberg plants. Shortly after promulgation, several aluminum companies filed petitions for administrative review of the NSPS arguing that the emission limits could not be achieved at all times - even by the best-controlled facilities.

[8] See 40 CFR Sections 60.282(a)(1)(ii) and 60.284(e)(1)(ii).

37. In response to the petition for review, EPA embarked on a program to collect additional data from the newest aluminum smelter in the U.S. After analyzing the new data, EPA concluded that the petitioners' argument was valid. To rectify the compliance problem, EPA reiterated the original emission limits but added regulatory language stating that emissions between 1.9 and 2.5 lb/ton for prebake plants and 2.0 and 2.6 lb/ton for Soderberg plants would be considered to be in compliance.[9] These excursions above the originally promulgated standard were allowed by EPA to account for the inherent variability of the fluoride emissions from the aluminum production process. The amended rule allowed for those excursions expressly in conjunction with a new requirement to conduct performance tests more frequently – monthly instead of annually, as originally required.

38. In sum, EPA adjusted the stringency of the standard using a combination of increased testing frequency with a relaxed numerical limit to make the emission standard consistent with the underlying data.

Methods of Measuring Opacity

<u>EPA Method 9</u>

39. Historically, the method used by a regulatory agency to verify that a source was operating and maintaining its particulate control technology in accordance with good engineering practices was that of visual observations of the stack plume, often conducted beyond the fence line of the facility. Such observations could be done only infrequently (and still can be done only infrequently).

40. Conducting opacity observations is a labor-intensive proposition. One observer, who must be qualified and certified in accordance with the requirements of EPA Method 9, is required per stack or per observation. More importantly, EPA Method 9 contains a number of

[9] 45 Fed. Reg. 44202 (June 30, 1980).

requirements for conducting opacity readings that inherently limit the frequency at which such readings can be performed. For example, §2.1 of EPA Method 9 states, . . . "the qualified observer shall stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back."[10] Thus, from a "requirements perspective," Method 9 observations can only be conducted a small fraction of the time that a plant can operate and, specifically, can not be conducted during a significant portion of a source's potential operating hours (e.g., at night, when precipitation is falling, etc.).

41. There are also practical and cost considerations that limit the frequency at which regulatory agencies can reasonably be expected to conduct Method 9 observations. Perhaps the most obvious is the amount of manpower required — to drive to a source, to obtain permission/clearance to enter the facility (when necessary), to properly position the observer with respect to the sun and the stack (per Method 9 requirements), and to take opacity readings for perhaps up to 1 hour.

42. As a result of the manpower requirements and given all of the other duties of agency field personnel, Method 9 opacity readings have typically been conducted no more than once or twice per year at major sources. If there is a single, most prevalent schedule, it is for the regulatory agency to dispatch a certified observer to conduct Method 9 opacity readings concurrently with the source's annual particulate matter (PM) emission tests.

COMS

43. COMS, on the other hand, is an instrument system designed to measure the attenuation of projected light due to the absorption and scattering of the light by PM in a gas

[10] Title 40, Code of Federal Regulations, Part 60, Appendix A, Method 9, §2.1.

tream. The basic components of a COMS are a light source, a retroflector (essentially a mirror), and a light detector.

44. In a typical application, light travels from the light source across the gas stream to the retroflector, and then is reflected back through the gas stream to the light detector. As light travels through the gas stream some will be absorbed or scattered by the PM and not reach the detector. The transmittance through the gas stream is reduced, allowing only a percentage of the original light intensity to be measured by the detector. Opacity is related to transmittance by the following expression.

$$Opacity\ (\%) = 100 - Transmittance\ (\%)$$

45. In order to produce acceptable data, a COMS must meet the performance requirements set forth by EPA in Performance Specification 1 (PS-1).[11] Although COMS technology is relatively simple, in my opinion COMS measurements can nevertheless be subject to inaccuracies and biases, and it is noteworthy that all of the typical operating problems with COMS (e.g., misalignment of the transceiver and the retroreflector; dirt on optical surfaces; etc.) result in the readings being higher than the true opacity. Stated another way, typical breakdowns in the operation of COMS tend to produce readings that are biased high.

46. In 1996, Tom Rose prepared a report examining the potential errors in COMS measurements.[12] Basing his analysis on the measurement deviations permitted by PS-1, Mr. Rose concluded that the potential COMS measurement error is +7.5 percent opacity. Mr. Rose went on to conclude:

> COMS are useful as an indicator of baghouse performance but should not be used as the deciding factor to measure violations unless the 7.5% margin of

[11] Title 40, Code of Federal Regulations, Part 60, Appendix B, Performance Specification 1.
[12] "Analysis of Errors in Continuous Opacity Measurement Systems," Tom Rose, prepared for Steel Manufacturers Association, December 2, 1996.

error is used. As with any measurement system, knowledge of the errors associated with the measurement is necessary in the compliance/non-compliance decision process.

47. To date, EPA has not promulgated any significant quality assurance (QA) requirements to detect and correct such problems after certification – perhaps because COMS is neither a reference method nor the specified compliance method for EPA-developed opacity standards. In my opinion, without such QA requirements it is difficult to assess the accuracy of ongoing COMS measurements.

Statistical Considerations Related to the Stringency of Emissions Standards

48. Over the past 30 plus years of experience, I have examined numerous emission datasets. These datasets have included SO_2 emissions, NO_X emissions, and opacity data. Almost without exception, these data tend to fit a lognormal distribution.

49. A lognormal distribution is a skewed distribution, one that is characterized by having an elongated tail instead of the classical bell-shaped curve characteristic of a normal distribution. It is relatively easy to visualize why emission distributions are lognormal. Emissions are naturally limited at zero (i.e., emissions cannot be negative), but for practical purposes, there is almost no upper bound limit to how high any specific air pollutant emission can be. Of course, opacity emissions are mathematically constrained at 100 percent and also at 0 percent. However, because of the installation and operation of highly efficient PM control technology, opacity readings also tend to be lognormally distributed with the tail or skewness being toward that of the higher opacity readings -- such as the example curve shown in Figure 1 of Appendix A.

50. The form of the distribution of opacity readings is very important, especially in the case where measurements or readings are conducted periodically, rather than continuously.

As explained below, when measurements are conducted only periodically, the results obtained will be those that occur most frequently.

Statistically-Based Solution

51. One way of approaching the stringency issue is to pose the question, "How often would Method 9 readings have to be taken in order to record at least one opacity excursion in excess of 40 percent?"

52. The probability ("P") of making a number of observations ("n") and not observing an event that occurs randomly twice out of every 100 possibilities (i.e., frequency of occurrence = 2%) is given by the equation $P = 0.98^n$. Likewise, the probability of making n observations and observing an event that occurs only two times out of every 100 possibilities is given by $P = (1 - 0.98^n)$.

53. I have solved this equation for a series of observations (n) and plotted the results as Figure 2 of Appendix A. What Figure 2 and the solution to the equation illustrates is that if you wish to be 95 percent confident in observing an event that occurs 2 percent of the time, then you must make at least 148 random observations. Likewise, if you wish to be very confident (i.e., 99 percent) in observing an event that occurs 2 percent of the time, then you must make 228 random observations.

54. This statistical analysis relates to Method 9 observations as follows. Suppose a source has 6-minute average opacity readings in excess of 40 percent 2 percent of the time. Further, suppose that you wish to have a 95 percent confidence of recording at least one such exceedance. Then, my statistical analysis shows that an observer would have to conduct 148 random Method 9 observations in order to be 95 percent certain of recordng at least one exceedance.

55. This statistical analysis is independent of time. That is, if a regulatory agency wished to detect, at a 95 percent confidence level, one exceedance during a calendar quarter then the agency would have to take 148 randomly spaced readings during the quarter. If the agency wished to detect, at a 95 percent confidence level, one exceedance during a calendar year then the agency would have to take 148 randomly spaced readings during the year.

56. Obtaining 148 random Method 9 observations would effectively require the performance of 148 Method 9 observations of a single stack. Clearly, conducting 148 Method 9 tests every quarter (more than one test per day per stack) or 228 per quarter if a confidence level of 99 percent were desired, is beyond what any regulatory agency could reasonably be expected to perform.

<u>Additional Statistical Approach</u>

57. As previously discussed, periodic emission standards are those that were developed using periodic and limited test data. Accordingly, the supporting databases tend to be insufficient to characterize the variability in either the process or the air pollution control technology. For that reason, such standards are typically set at levels that may well be exceeded during any given test. Typically, such standards are set at a 5 to 10 percent probability of failure level along with the implicit assumption that compliance tests can only be conducted infrequently.

58. In 1995, Robert Ajax authored a paper that discussed the relationship of measurement frequency and the stringency of technology-based emission limits.[13] Table 2 from the Ajax paper is reproduced below.

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[13] "The Effect of Compliance Test Frequency on the Stringency of Technology Based Standards," Robert L. Ajax, March 9, 1995.

Number of Exceedances Expected

Probability Level of Standard	Frequency of Compliance Computation			
	Every 6 Min.	Every 6 Hrs.	Daily	Annually
90%	8,760/yr	219/yr	36/yr	1/10 yr
95%	4,380/yr	110/yr	18/yr	1/20 yr

Mr. Ajax's tabulation compliments the statistical approach presented in paragraphs 51 through 56 of this Affidavit. That is, Mr. Ajax's table enumerates the number of exceedances expected as a function of measurement frequency and probability of compliance. For example, if a source were in compliance 95 percent of the time and compliance were measured every 6 minutes, then 4,380 exceedances would be expected per year. On the other hand, if compliance were measured daily, only 18 exceedances would be expected per year.

Combining the Statistical Approaches

59. Paragraphs 51 through 56 of this Affidavit answered the question, "How frequently must one make measurements in order to determine a specified (e.g., 2 percent) exceedance rate, at various levels of confidence?" Given a measurement frequency, paragraphs 57 and 58 enumerate the number of expected exceedances as a function probability of compliance.

60. These two analyses approach the question in more or less opposite directions, yet reach a consistent conclusion – that the stringency of an emission standard is strongly dependent on the frequency of measurement. In other words, increasing the measurement frequency will increase the stringency of a standard unless one of the other elements (e.g., averaging time) is adjusted.

61. Thus, it is my opinion that switching from Method 9 to COMS to enforce Wyoming's opacity standard without a revision to one of the other elements of an emission

standard (e.g., averaging time or numerical limit) results in a significantly more stringent opacity standard.

Recent Recognition By States That COMS Is More Stringent Than Method 9

62. Recently, a number of states have begun to revise their opacity regulations to account for measurement with continuous monitors while maintaining a periodic Method 9 compliance test. Such regulatory revisions are quite consistent with the action taken by EPA in the previously discussed kraft pulp mill NSPS.

Alabama

63. For a number of years, coal-fired utility boilers in Alabama have been subject to a visible emission standard, which is codified as Alabama Department of Environmental Management (ADEM) Rule 335-3-4.01(1). The visible emission standard was not developed using continuous monitoring data since such data were not available at the time the standard was developed more than 30 years ago.

64. Under the Alabama rule, compliance with the visible emission standard is determined periodically by a certified observer making opacity readings in accordance with EPA Method 9. Alabama Rule 335-3-4.01(a) limits opacity to 20 percent, as determined by 6-minute averages. The 20 percent opacity limit in the current Alabama regulations and included in the Alabama SIP was developed as a periodic standard to be verified with Method 9. However, under ADEM Rule 335-3-4-.01(1)(b), visible emissions up to 40 percent are permitted during one 6-minute period in any 1-hour period, and emissions during startup, shutdown, and load change events are excluded.

65. Recently, the Alabama Department of Environmental Management (ADEM) proposed to amend its visible emissions regulation. Specifically, ADEM proposed to amend

Rule 335-3-4-.01 by adding 335-3-4.01(3), 335-3-4.01(4) and 335-3-4.01(5). New paragraph (3) sets forth the requirements that a COMS must meet in order to be used to determine compliance with the visible emissions rule, which is provided in paragraph (1) of this rule. New paragraph (4) is the linchpin of ADEM's proposed rule amendment. Paragraph (4) states, "the permittee will not be deemed in violation of Rule 335-3-4-.01(1) if the non-exempt excess emissions periods do not exceed 2.0 percent of the source operating hours for which the opacity standard is applicable and for which the COMS is indicating valid data."

66. This is clear evidence that ADEM understands the difference between periodic and continuous standards, and recognizes that its 20 percent periodic (Method 9) opacity limitation cannot be achieved by a source operating its equipment consistent with good air pollution control practices during all operating periods, even when non-exempt periods are excluded. In other words, when changing from a periodic compliance method (e.g., Method 9) to a continuous compliance method (e.g., COMS data), an accompanying change is required (i.e., creating the 2 percent exemption) to maintain the stringency of the original visible emissions standard.

North Carolina Rule

67. The North Carolina Department of Environment and Natural Resources recently revised the North Carolina SIP with respect to the use of COMS data for opacity. North Carolina amended its visible emissions standard to establish a "reasonable procedure" for sources using COMS to demonstrate compliance with the visible emission standard. After first deducting potentially numerous exemptions (i.e., startup, shutdown, malfunction and other scenarios under

the rule), the North Carolina rule allows opacity readings in excess of the numerical limit 0.8 percent of the time.[14]

68. EPA approved this standard, after evaluation by North Carolina and others on the grounds, in part, that the rule "is designed to provide sources using COMS the same opportunity to comply with the visible emissions rule as sources that do not use COMS devices."[15] In other words, EPA concurred that the use of COMS to determine compliance with a standard developed with the intent to be enforced with Method 9 would result in a more stringent standard unless the numerical limit was revised upward or a de minimis excess emission period was excluded.

Ohio

69. Similarly, following the current trend of promulgating continuous standards, which are modified to be equivalent to historical periodic standards, the Ohio Environmental Protection Agency in 2002 revised its regulations with respect to the use of COMS data. Ohio revised Rule 3745-17-03(B), to state that during each calendar quarter, the permittee shall be deemed in compliance with the opacity standard if the following conditions are met:

1. *The nonexempt opacity values in excess of twenty per cent opacity are less than 1.10 per cent of the six-minute average opacity values.*
2. *None of the nonexempt six-minute average opacity values exceeds sixty per cent.*
3. *The total amount of time, in hours, of exempt*[16] *and nonexempt opacity values greater than twenty per cent and less than sixty per cent (not including start-up, shutdown, and malfunction exemptions) does not exceed the product of 0.10 times the actual number of hours the emissions unit was in operation during the calendar quarter.*

Strangely, EPA is proposing to disapprove the Ohio revisions that provide for the use of continuous opacity monitoring (COM) data to determine compliance with opacity limits, but

[14] The numerical opacity limit in the North Carolina rule for sources in operation prior to July 1, 1971 is 40 percent.
[15] 70 Fed. Reg. 28496 (May 18, 2005). EPA's is proposing to approve, in its entirety, the Visible Emissions portion of the North Carolina State Implementation Plan (SIP).
[16] Exempt opacity values are specifically defined in Ohio Rule 3745-17-07(A).

allow specified de minimis periods. Apparently, because of the de minimis exemption periods, EPA proposes to find that the Ohio revisions constitute a relaxation of the existing Ohio opacity rules.[17] I term EPA's proposal "strange" because approximately 6 weeks earlier, the Agency proposed to approve a very similar SIP revision submitted by North Carolina (see discussion in paragraphs 67 and 68).

Tennessee

70. In Tennessee, compliance with the State's visible emissions standard is to be determined periodically by a certified observer making opacity readings in accordance with EPA Method 9. However, under Tennessee Department of Environment and Conservation (TDEC) Rule 1200-3-5-.03(5), the Technical Secretary may agree to the use of continuous opacity monitors (COMS) for determining compliance with the opacity limit after specifying in the appropriate permit the operational availability and quality assurance requirements for the COMS. For fuel burning sources, TDEC Rule 1200-3-20-.06(5)(a) defines a de minimis period for opacity in excess of the applicable opacity limit to be equal to 2 percent of facility operating time per calendar quarter, excluding periods of start-up, shutdown, and excused malfunctions. Statistically, this analysis shows that for a fixed opacity percentage limit, COMS with a 2 percent de minimis exemption is likely to be more stringent than the same numerical percentage limit when enforced with periodic Method 9 observations and no de minimis periods.

[17] 70 Fed. Reg. 36901 (June 27, 2005).

Conclusions

71. Based on the foregoing, and in addition to my conclusions contained herein, it is my opinion that:

- The MCC Kiln No. 2 opacity limit, if enforced with COMS data, would be considerably more stringent than the limit when verified with periodic method 9 readings.

Dated this 29 day of July, 2005.

Ralph L. Roberson

State of North Carolina)
)
County of Wake)

Subscribed and sworn to before me by Ralph L. Roberson on this 29th day of July, 2005.

Witness my hand and official seal.

Stacey Toney Pierce
Notary Public

My commission expires: 02-23-09

OFFICIAL SEAL
STACEY TONEY PIERCE
NOTARY PUBLIC - NORTH CAROLINA
WAKE COUNTY
My Comm. Expires 02-23-2009

APPENDIX A

Figure 1. Frequency Distribution of Opacity Data
[One Calendar Quarter]

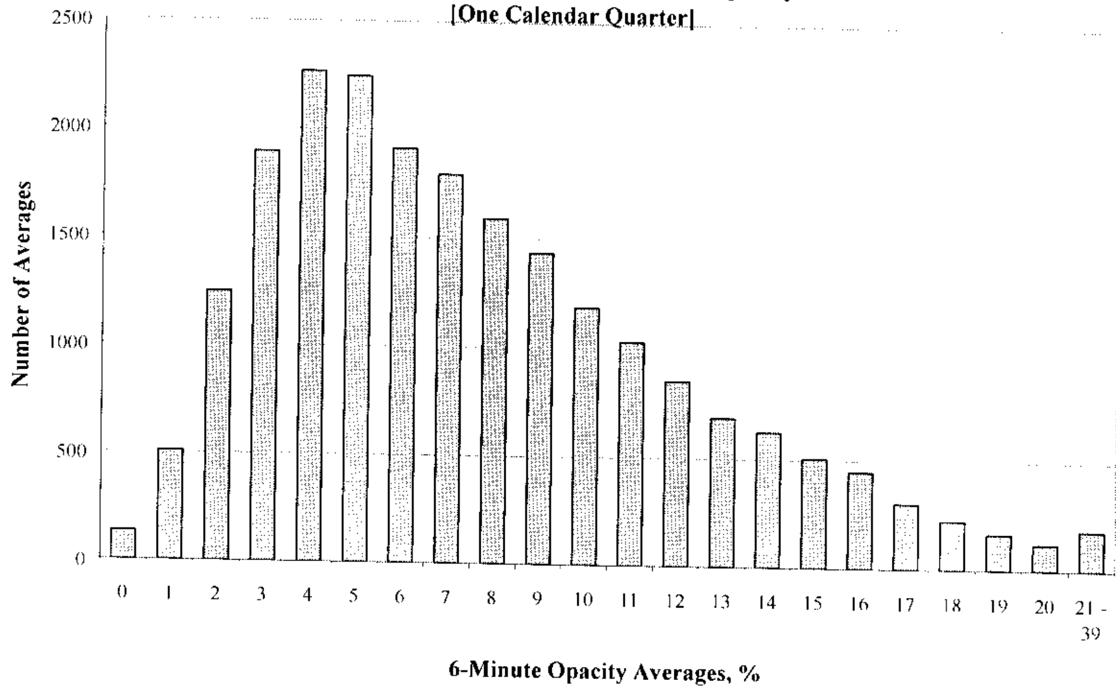

Figure 2. Frequency of Event = 2%